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AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P
ONE COMMERCE SQUARE
2005 MARKET STREET, SUITE 2200
PHILADELPHIA PA 19103

EXAMINER

VARCOE JR, F

ART UNIT PAPER NUMBER

1764

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/357,507

Applicant(s)

Taguchi et al.

Examiner

Varcoe

Group Art Unit

1764

 Responsive to communication(s) filed on Jan 10, 2000 This action is FINAL. Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1035 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim Claim(s) 1-19 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

 Claim(s) _____ is/are allowed. Claim(s) 1-19 is/are rejected. Claim(s) _____ is/are objected to. Claims _____ are subject to restriction or election requirement.**Application Papers** See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948. The drawing(s) filed on Jul 20, 1999 is/are objected to by the Examiner. The proposed drawing correction, filed on _____ is approved disapproved. The specification is objected to by the Examiner. The oath or declaration is objected to by the Examiner.**Priority under 35 U.S.C. § 119** Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d). All Some* None of the CERTIFIED copies of the priority documents have been received. received in Application No. (Series Code/Serial Number) _____ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

 Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).**Attachment(s)** Notice of References Cited, PTO-892 Information Disclosure Statement(s), PTO-1449; Paper No(s). 2, 4 Interview Summary, PTO-413 Notice of Draftsperson's Patent Drawing Review, PTO-948 Notice of Informal Patent Application, PTO-152**--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---**

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DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include reference sign(s) not mentioned in the description. For example, in Figure 3, numbers 12, 13, 14, 15, 16, and 19 are not mentioned in the specification. Other figures also have numbers that are not mentioned in the specification. Correction is required.

Claim Objections

2. Claim 15 is objected to because of the following informalities: there appears to be a typographical error in line 5. Does applicant intend that there be only one pellet in the catalyst bed? Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 4, 7-11 and 12-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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With regard to claim 3, line 3 recites "formed by a different catalyst." Does this mean formed of different catalyst materials? The fact that two portions of the same catalyst material exist in two different locations makes them two different catalysts.

With regard to claim 7, the term "close" is a relative term. It is not clear what distances qualify as close and which do not.

With regard to claim 8, "passes in an opposing direction of stream" in line 3 is not clear. It should be rewritten to be clearer.

With regard to claim 12, the claim describes a pathway that bifurcates, with one of the two branches created from the original single pathway (by the bifurcation of that pathway) connected to the reaction segment at the middle point of the reaction layer. It is not clear where the other of the two branches connects.

Claim 12, line 7 recites "acting as said means for cooling." "Acting" is not a term that describes a structural relationship between two elements of an apparatus. The relationship between the two branches and cooling and heating is not clear. Does one branch connect to one part and the other branch connect to the other part?

With regard to claim 16, it is not clear what is meant by a "two-segmented honeycomb shaped catalyst layer." Does it mean that there are exactly two passages through the honeycomb?

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Or is some other feature of the catalyst present in exactly two parts? In line 2, what does "at least" refer to? At least two (segments), or at least a layer?

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Heil et al., U.S. Patent No. 5,874,051.

With regard to claim 1, Heil discloses a hydrogen purifying apparatus for oxidizing and removing carbon monoxide in a reformed gas containing carbon monoxide in addition to the main component of hydrogen gas, the apparatus comprising a reaction segment (Figure 1 (5)) having a catalyst layer for oxidizing carbon monoxide, a reformed gas supply segment (2) for supplying the reformed gas to the reaction segment via a reformed gas supply pathway, an oxidant gas supplying segment (3) for supplying an oxidant gas on the path of the reformed gas supply pathway, means (6) for cooling the catalyst layer at the upstream side, and means for heating the catalyst layer at the downstream side. That means is the exothermic CO oxidation reaction that is controlled by the apparatus along the reactor path (Heil Abstract).

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With regard to claim 2, Heil discloses a fluid means for cooling the catalyst layer (column 3 lines 50-65). Heil's control of the exothermic reaction at various locations along the reactor path (Heil Abstract) amounts to a heater.

With regard to claim 5, Heil discloses heating the catalyst using reaction heat generated by the reaction of carbon monoxide and hydrogen in the reformed gas with the oxidant gas (Heil Abstract).

With regard to claim 6, Heil discloses supplying an amount of oxidant gas that changes in response to the temperature of the catalyst layer (column 4 lines 28-49). However, changing a flow rate is a procedural step and not a structural element of an apparatus.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
9. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al., U.S. Patent No. 5,874,051 as applied to claims 1 and 2 above, in view of Trocciola et al. U.S. Patent No. 5,330,727.

With regard to claim 3, the apparatus of Heil is essentially the same as that of the instant claim but fails expressly to include catalyst layers formed of different catalyst materials.

Trocciola discloses operating two different catalyst beds under different conditions that lead to different performance results (column 6 lines 1-36). At the time of the invention it would have been obvious to one skilled in the art that getting different results from two different catalyst beds might best be accomplished by using two different types of catalyst materials. The motivation would have been to take advantage of the differences in the catalyst materials.

Trocciola discloses operating the downstream catalyst at a lower temperature than the upstream catalyst (column 6 lines 1-36)

With regard to claim 4, Heil discloses using metallic support material for the catalyst (column 3 line 43).

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10. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al., U.S. Patent No. 5,874,051 as applied to claims 1 and 2 above, in view of Kobylinski et al.

With regard to claim 7, Heil discloses essentially the same apparatus as the present invention but fails expressly to disclose a flow pathway of the reformed gas formed close to the catalyst layer via a partition so as to heat the catalyst.

Kobylinski discloses a catalyst system for processing a heated gas wherein the gas travels a pathway close to the catalyst layer and heats the layer through a partition so as to heat the downstream side of the catalyst layer (Kobylinski column 5 lines 15-26).

Kobylinski and Heil are analogous in that both deal with catalytic processing of hot gases in automotive applications.

At the time of the invention it would have been obvious to one skilled in the art to combine the catalyst heating structure of Kobylinski with the apparatus of Heil.

The motivation would have been to control the temperature inside the catalyst bed (Kobylinski column 5 lines 15-26).

With regard to claim 8, Kobylinski discloses the gas first passing beside the catalyst layer in a direction opposite to the direction the stream later takes when passing in direct contact through the catalyst layer.

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With regard to claim 9, Kobylinski discloses a reaction segment placed on the periphery of the gas flow pathway (Kobylinski Figure 1).

With regard to claim 10, Kobylinski discloses a reaction segment that is tube-shaped and where the flow pathway of the gas before passage in contact with the catalyst is formed around the reaction segment (Kobylinski column 5 lines 15-26).

With regard to claim 11, it would have been obvious to place multiple parts of the apparatus in parallel. The motivation would have been to permit one part to fail without affecting the performance of other, parallel, parts of the apparatus.

11. Claims 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heil et al., U.S. Patent No. 5,874,051 as applied to claims 1 and 2.

With regard to claim 12, Heil discloses essentially the same apparatus as the present claim but fails expressly to disclose introducing a mixture of reformed gas and oxidant gas at a middle point of the catalyst layer.

Heil does disclose introducing oxidant at a middle point in the catalyst layer. At the time of the invention it would have been obvious to one skilled in the art to introduce a mixture of oxidant and reformed gas at a middle point of the catalyst layer.

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The motivation would have been to further enable controlling the exothermal CO oxidation along the reactor path (Heil Abstract).

With regard to claim 13, Heil discloses valves (4) used for changing the cross-sectional area of the reformed gas pathway and the branched pathway in order to control the amount of gas supplied to the reaction segment.

With regard to claim 14, Heil discloses a reaction segment with at least a two-segmented catalyst layer and at least the uppermost catalyst layer has a part with no catalytic function or a part with low reactivity to CO (Heil column 4 lines 2-5).

With regard to claim 15, Heil discloses a catalyst layer composed of catalyst pellets (column 3 lines 40-47) and metal support units. It is well known in the art to form metal support units for catalysts into honeycomb shapes.

With regard to claim 16, Heil discloses multiple catalyst segments (Figure 1). Lacking a showing of criticality, the relative sizes of parts of the layers is merely an obvious design choice.

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With regard to claim 17, Heil discloses catalyst layers comprising a platinum group metal supported by an alumina material and a platinum group supported by a zeolite (column 53 lines 39-41).

With regard to claim 18, Heil discloses an uppermost catalyst layer heated to a higher temperature than the lowermost catalyst layer (column 1 lines 50-57).

With regard to claim 19, Heil discloses controlling the temperature in the system to achieve a desired temperature profile (column 6 lines 51-56) using metering devices controlled by a central control device (column 4 lines 45-49). Although temperature measuring apparatus is not explicitly mentioned, it is inherent in temperature control apparatus as described by Heil.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Varcoe, whose telephone number is (703) 306-5477. The examiner can normally be reached Monday through Friday from 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian Knode, can be reached on (703) 308-4311.

The FAX telephone number for this Group Art Unit is (703) 305-3599 (for Official papers after Final), (703) 305-5408 (for other Official papers) and (703) 305-6357 (for Unofficial papers).

When filing a FAX in Group 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other

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communications with the PTO that are not for entry into the file of the application. This will expedite processing your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

RV
March 17, 2001

Marian C. Knodle
MARIAN C. KNODE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700